Innovators Educational Foundation (IEF) is a 501(c)3 nonprofit that organizes the US collegiate solar car events. IEF is made up of a core group of dedicated volunteers, mostly former competitors, that know first-hand the value of a hands-on, multidisciplinary, innovative project to the educational experience. In addition to experiential learning, these solar car events promote energy efficiency and raise public awareness of the capabilities of solar power.

If you are interested in forming a team to participate in future events or providing support to the program as an event partner, sponsor, or volunteer, please contact us!

Innovators Educational Foundation
1028 S Bishop Ave #314, Rolla, MO 65401
ief@americansolarchallenge.org
Promoting educational excellence and engineering creativity, the American Solar Challenge (ASC) and Formula Sun Grand Prix (FSGP) are collegiate student design competitions. Teams from the US, Canada, and around the world design and build solar-powered vehicles within a set of regulations. Once at the event, these vehicles are put through a series of inspections, a process known as scrutineering. Teams that successfully pass scrutineering and qualify during the track event will then take on the 1400+ mile journey following the Oregon National Historic Trail.

SCRUTINEERING JULY 1-4
The solar cars undergo a series of inspections covering all aspects of the car, including electrical systems, mechanical systems, body and sizing, dynamic testing, and more. Inspectors check that the solar cars are built in alignment with the regulations and have all required safety features. Passing scrutineering is a big accomplishment for the teams and a requirement to participate in the track and road events.

A TYPICAL DAY ON THE ROAD
7 AM
Battery release and morning charging. Teams check over their solar cars, eat breakfast, and prepare for the day ahead.

8 AM
Drive. As needed, stop to charge, fix a flat, or change drivers. Upon arrival at a Checkpoint (designated 45-minute stops), the team jumps out of the support vehicles and points the solar array towards the sun. The support vehicles may leave to get fuel or other supplies. Observers check in with the event staff, route updates are given, and the public has the opportunity to see the cars and meet the teams. Then the solar car can resume driving the base route or gain extra mileage by driving an optional loop.

6 PM
Evening charging. Teams are given a 45-minute grace period to find a safe place to stop for the night, if between stage points. At the end of each stage, teams all charge from the sun at the Stage Stop.

8 PM
Battery impound followed by time to work on the solar car (minus batteries), find lodging, check the weather forecast, and get ready for the next day.

Due to the staggered start, end of the day, grace periods, and time zone adjustments, the exact schedule may deviate.
Representing a variety of universities and colleges, these teams have taken on the nominal 2-year project of designing, building, and testing a solar powered vehicle to prepare for competition. The teams are split into two classes for the events.

### 2 classes

#### Single-Occupant Vehicles (SOV)
- Seats 1 person
- Smaller allowable solar array size
- Batteries are limited by weight
- No recharging via external sources (penalty would be incurred)
- Scoring is based on the official distance completed, including any penalties incurred. (Ties are determined by the lowest overall elapsed time.)

#### Multi-Occupant Vehicles (MOV)
- Seats 2 or more people
- Larger allowable solar array size
- No limit on amount of batteries
- Recharging via external sources is allowed and energy is metered
- Scoring is a combination of an energy efficiency score (people-distance, time, and external recharging) and a practicality score
- Targeting an average speed of at least 35mph (ASG) and 30mph (FSGP)

### University of Kentucky
**#3 Gato del Sol VI**
- **L x W x H:** 5.00m x 1.74m x 1.14m
- **Weight:** 247kg
- **Motor:** Mitsubishi 2096D
- **Batteries:** 4.5kWh Li-Ion (20kg)
- **Wheels:** 4 Aluminum 16"
- **Chassis:** Aluminum-Fiberglass Composite

### MIT
**#4 Nimbus**
- **L x W x H:** 4.06m x 1.60m x 1.02m
- **Weight:** 203kg
- **Motor:** Mitsubishi 2096D
- **Batteries:** 4.5kWh Li-Ion (20kg)
- **Wheels:** 4 Aluminum 16"
- **Chassis:** Aluminum-Fiberglass Composite

### University of Florida (Solar Gators)
**#5 Sunrider**
- **L x W x H:** 5.00m x 1.00m x 1.50m
- **Weight:** 330kg
- **Motor:** 1 Mitsubishi
- **Batteries:** 5.0kWh Li-Ion (20kg)
- **Wheels:** 4.16"
- **Chassis:** Carbon Fiber

### U of California, Berkeley (CalSol)
**#6 Excalibur**
- **L x W x H:** 5.00m x 1.00m x 1.50m
- **Weight:** 166kg
- **Motor:** 1 Mitsubishi
- **Batteries:** 5.1kWh Li-Ion (20kg)
- **Wheels:** 4 Tubeless 16"
- **Chassis:** Composite Monocoque

### Iowa State University (PrISUm)
**#9 Eliana**
- **L x W x H:** 4.98m x 1.12m x 2.10m
- **Weight:** 476kg
- **Motor:** 2 Mitsubishi M2096-D3
- **Batteries:** 16.9kWh Li-Ion (71.2kg)
- **Wheels:** 4 Bridgestone Ecopia 16"
- **Chassis:** Monocoque

### Northwestern University
**#11 Aurora**
- **L x W x H:** Not provided
- **Weight:** Not provided
- **Motor:** Not provided
- **Batteries:** 13.1kWh Li-Ion (50.7kg)
- **Wheels:** Not provided
- **Chassis:** Not provided

### Michigan State University
**#13 PrISUm**
- **L x W x H:** 4.20m x 1.75m x 1.10m
- **Weight:** 680kg
- **Motor:** 1 Mitsubishi
- **Batteries:** 5.3kWh Li-Ion (25kg)
- **Wheels:** 4 Carbon Fiber 18"
- **Chassis:** Chromoly Steel Space Frame

### Illinois State University
**#17 Arrow 6**
- **L x W x H:** 4.50m x 1.40m x 1.10m
- **Weight:** 220kg
- **Motor:** 1 Mitsubishi
- **Wheels:** 4 Carbon Fiber 18"
- **Chassis:** Carbon Fiber Monocoque

### University of British Columbia
**#26 Daybreak**
- **L x W x H:** 4.50m x 1.40m x 1.00m
- **Weight:** 160kg
- **Motor:** 1052W SunPower Silicon
- **Batteries:** 5.1kWh Li-Ion (20kg)
- **Wheels:** 4 Aluminum 16"
- **Chassis:** Carbon Fiber Semi-monocoque

### Principia College
**#32 RA XI**
- **L x W x H:** 3.90m x 1.80m x 1.07m
- **Weight:** 170kg
- **Motor:** 1052W SunPower Silicon
- **Batteries:** 4.0kWh Lithium Polymer (20kg)
- **Wheels:** 4 Carbon Fiber 16"
- **Chassis:** Chromoly Steel Space Frame

### Georgia Institute of Technology
**#49 Endurance**
- **L x W x H:** 5.00m x 1.90m x 1.20m
- **Weight:** 531kg
- **Motor:** 1052W SunPower Silicon
- **Wheels:** 4.3kWh Li-Ion (85kg)
- **Wheels:** 4 Carbon Fiber 16"
- **Chassis:** Chromoly Steel Space Frame

### University of Minnesota Twin Cities
**#55 Freya**
- **L x W x H:** 5.00m x 1.25m x 1.20m
- **Weight:** 200kg
- **Motor:** 2 Mitsubishi M2096-D3
- **Wheels:** 4.4" GH Craft Carbon Fiber 16"
- **Chassis:** 4130 Steel Space Frame

### University of Illinois at Urbana-Champaign
**#22 Brizo**
- **L x W x H:** 5.00m x 1.20m x 1.00m
- **Weight:** 192kg
- **Motor:** 1 Mitsubishi
- **Wheels:** 4 GH Craft Carbon Fiber 16"
- **Chassis:** Aluminum-Monocoque Carbon Fiber Panel

### U of Illinois at Urbana-Champaign (Illini)
**#6 Excalibur**
- **L x W x H:** 5.00m x 1.20m x 1.00m
- **Weight:** 192kg
- **Motor:** 1 Mitsubishi
- **Wheels:** 4 Carbon Fiber 18"
- **Chassis:** Semi-Monocoque Carbon Fiber Panel

### Polytechnique Montréal (Esteban)
**#5 Esteban 10**
- **L x W x H:** 4.90m x 1.35x x 1.25m
- **Weight:** 330kg
- **Motor:** 2 Mitsubishi M2096-D3
- **Wheels:** 4 Carbon Fiber 16"
- **Chassis:** Composite Material Sandwich Panels
**By 1859, over 50,000 people had followed the old trail, carrying Oregon to statehood that year.**

In 1978, Congress designated the route as the Oregon National Historic Trail.

Most of the wagons on the trail were known as “Prairie Schooners,” due to their cloth covering billowing in the breeze.

Heavy items in the wagons often ended up left along the trail.

The 2022 American Solar Challenge will follow portions of the Oregon Trail and other national historic trails from Missouri to Idaho!

**Independence, Missouri, was one of many landings where emigrants of the mid-1800s “jumped off” onto the overland wagon trails.**

**July 9-16, 2022**

Miles of trail ruts and traces can still be seen along the Oregon National Historic Trail, reminders of the sacrifices, struggles, and triumphs of early American settlers and the diversity of the lands and cultures they encountered.

**Independence Square**

The location of frenzied outfitting activity, Independence Square was the last significant point of supply for emigrants until the mid-1840s, when Westport also became an outfitting town. Look for statues of US presidents, historical markers and monuments, and interpretive exhibits.
**University of Calgary**

*Schulich Elysia*

- **L x W x H:** 4.50m x 1.80m x 1.17m
- **Weight:** 545kg
- **Array:** 1200W SunPower Silicon
- **Batteries:** 18kWh Li-Ion (69.1kg)
- **Motor:** 2 Marand BLDC
- **Wheels:** 4 Alloy 16"
- **Chassis:** Carbon Fiber Monocoque

**University of Toronto (Blue Sky)**

*77 Borealis*

- **L x W x H:** 5.00m x 1.18m x 1.03m
- **Weight:** 180kg
- **Array:** 1100W SunPower Silicon
- **Batteries:** 5.25kWh Li-Ion (20kg)
- **Motor:** 1 Mitsuba
- **Wheels:** 4 Aluminum Alloy 16"
- **Chassis:** Carbon Fiber Monocoque

**University of Virginia**

*Rivanna*

- **L x W x H:** 5.00m x 1.65m x 1.16m
- **Weight:** 270kg
- **Array:** 900W SunPower Silicon
- **Batteries:** 4.6kWh Li-Ion (96.8kg)
- **Motor:** 1 Mitsuba
- **Wheels:** 4 Aluminum 16"
- **Chassis:** 1020-alloy Steel Space Frame

**NC State (SolarPack)**

*SPX*

- **L x W x H:** 4.15m x 1.74m x 1.44m
- **Weight:** 1003kg
- **Array:** 500W SunPower Silicon
- **Batteries:** 20.6kWh Li-Ion (98.6kg)
- **Motor:** 1 Emrax 228
- **Wheels:** 4 BMW i3 19"
- **Chassis:** Steel Monocoque

**École de Technologie Supérieur (Éclipse)**

*11 Eclipse 11*

- **L x W x H:** 4.40m x 1.50m x 1.10m
- **Weight:** 1003kg
- **Array:** 600W SunPower Silicon
- **Batteries:** 18kWh Li-Ion (69.1kg)
- **Motor:** 1 Mitsuba
- **Wheels:** 4 Carbon 16"
- **Chassis:** Carbon Fiber Monocoque

**Western Michigan University (Sunseeker)**

*Aethon*

- **L x W x H:** 3.80m x 1.70m x 1.15m
- **Weight:** 370kg
- **Array:** 992W SunPower Silicon
- **Batteries:** 5.1kWh Li-Ion (20kg)
- **Motor:** 1 Marand
- **Wheels:** 4 Moped 16"
- **Chassis:** Carbon Fiber/KeVlar Monocoque

**Appalachian State (Team Sunergy)**

*Rose*

- **L x W x H:** 4.74m x 2.10m x 1.24m
- **Weight:** 500kg
- **Array:** 1212W SunPower Silicon
- **Batteries:** NMC (140kg)
- **Motor:** 2 Mitsuba M2256-D3
- **Wheels:** 4 Custom Aluminum 16"
- **Chassis:** Carbon Fiber/KeVlar Sandwich

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The challenge of the American Solar Challenge begins long before the solar cars head West on the Oregon Trail.

A solar car team effectively acts as a small business—attracting sponsors, managing public relations, developing and executing a project plan, and, yes, producing a solar powered vehicle.

In addition to the design and build of the solar car, teams must also plan for the logistical challenges of traveling with a team for more than 2 weeks—lodging, meals, support vehicles, safety equipment, and more.

More than road trip, strategic decisions must be made along the way to manage the available solar energy and determine how many optional loops to complete.

While most teams have engineers, you will also find majors in business, marketing, and other fields. The beyond-the-textbook, multi-disciplinary aspect of the solar car experience serves these students well as they prepare for their future careers across a range of industries.

---

**TheUniversity of Kansas (KU)**

*Astra*

- **L x W x H:** 3.76m x 1.23m x 1.02m
- **Weight:** 304kg
- **Array:** 704W SunPower Silicon
- **Batteries:** 5kWh Li-Ion (20kg)
- **Motor:** 2 QS
- **Wheels:** 4 Draglite 15"
- **Chassis:** 4130 Chromoly Steel Tube

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Why do solar cars look so different?

Conventional passenger cars typically use more energy overcoming air resistance, known as aerodynamic drag. Solar cars are designed to minimize the energy lost due to drag, resulting in unique shapes and lightweight designs. Many solar cars include fairings around the wheels to further improve aerodynamics.

Is the first team across the line the winner?

Not necessarily. The winner of the single-occupant vehicle class is determined based on the official mileage completed across all stages of the event, including optional loops and reduced for any penalties incurred. For the multi-occupant vehicle class, additional considerations of energy efficiency and practicality factor into the overall score.

How fast can the solar cars go?

Teams must obey posted speed limits, and regulations limit the cars to 65 mph for the event. During testing, some solar cars have reportedly reached speeds of 105+ mph.

What about cloudy days?

Solar cars carry batteries that can be charged using the solar cells on the car. When facing clouds or needing extra power, the car uses this stored energy. Hence, the solar cars can continue to drive in the clouds and rain, although likely at a slower speed to conserve energy.

Can I buy a solar car?

These solar cars are built specifically for competition; however, there are many EVs and plug-in hybrids that can be bought today and charged from home solar panels.

Do teams pick the lightest driver?

All drivers are ballasted to 80kg for the event, so individual driver weight is not a primary factor. Efficient driving skill is more important.

What are the Optional Loops?

Select stage/checkpoints offer teams the opportunity to drive optional loops to increase their mileage and demonstrate the capabilities of their solar car. Teams are ranked on official distance and then by official elapsed time to complete that distance.

Do the cars have air conditioning?

No. Though teams are required to provide driver ventilation, these vehicles are designed to maximize energy efficiency. Air conditioning, power windows, and other creature comforts would consume electricity without improving the car’s performance.

How do solar cars work?

Solar cars use photovoltaic cells to convert sunlight into energy. This energy powers an electric motor to make the car go or can be used to charge batteries to store energy for those not-so-sunny days.

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The Iosix OBD-II V5 Tracker

- **Specs:**
  - 4G LTE
  - FMCSA ELD Data Tracking
  - GPS w/ Multi-GNSS
  - Bluetooth
  - WiFi

**Welcome Race Teams!**

For any questions about our facility, please visit heartlandmotorsports.us or call us at 765-861-7089

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